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# Demining Quality Management: Case Studies from Jordan

Two case studies of clearance in the Jordan Valley and along Jordan's northern border highlight the importance of quality management to ensure efficiency of clearance and credibility of land release.

by Jamal Odibat [ National Committee for Demining and Rehabilitation ]



Quality control inspection of cleared land in the Jordan Valley.  
All photos courtesy of NCDR quality management team.

The aim of quality management (QM) in the survey and clearance of mine-contaminated areas is to provide beneficiaries, demining organizations and national authorities with confidence that land release is in accordance with agreed-upon standards.<sup>1</sup> Other goals of QM include ensuring the safety of deminers while working and providing assurances that released land is safe to use. Quality assurance (QA) and quality control (QC) comprise QM with the intention of achieving consistent quality throughout the entire operation. Specifically, QA is conducted by assessing that the process is followed, whereas QC is performed by physically checking the finished product.

The purpose of QA is to confirm that management practices and operational procedures are appropriate, applied correctly and capable of safely and efficiently achieving the stated require-

ments. Internal QA is conducted by survey and clearance organizations, while external QC inspections are undertaken by national mine action authorities or other contracted agencies.

QA includes

- Assurance that equipment, including mechanical and organic demining assets, functions properly and operates according to agreed-upon standards
- Monitoring of survey and clearance teams during operations to ensure that procedures are followed
- Accreditation of the clearance organization and assets
- Review of documentation to ensure that records are maintained per agreement

QC relates to the inspection of a finished product, which normally involves taking samples of previously cleared land to validate that the work meets the contractual standard. External QC takes place when a task is complete and is conducted through sampling by national mine action authorities or other contracted agencies. External sampling is a particularly expensive way to ensure quality and should be kept to a minimum. Internal QC takes place simultaneously when survey and clearance organizations are conducting clearance. For instance, immediately after the confirmed hazardous area has been cleared, the demining organization follows its clearance efforts with a manual inspection of the cleared land, taking samples to provide confidence that the clearance requirements have been met.

QM, which consists of monitoring the clearance process (QA) and sampling of the cleared areas (QC), is a legally bound component of all demining operations in Jordan as stipulated by the National Technical Standards and Guidelines that Jordan adopted in 2006.<sup>2</sup>

A comparison of clearance projects in the Jordan Valley and along Jordan's northern border reveals the importance of timely QM. QM instills confidence and trust in the work



Quality assurance checking of the clearance process in Jaber, along the northern border of Jordan.

being accomplished, which extends to end users. Factors reviewed in the case studies include

- Are the processes' results predictable?
- Is the land free of mine and explosive remnants of war (ERW) contamination, so that it can be released to users?
- What are the effects of quality management, or the lack of quality management, on clearance efficiency and land release credibility?

#### **Jordan Valley Project**

The Jordan Valley region, located in the northwest along Jordan's border with Israel, experienced landmine and unexploded ordnance (UXO) contamination due to Jordan's participation in the 1948 and 1967 Arab-Israeli Wars.<sup>3</sup> Despite this pollution, the area serves as the country's main source of food security. With its fertile land and favorable climate, Jordan exports large amounts of produce year round, and the country has great potential for agricultural and economic development.

The Jordan Valley contained a total of 266 minefields, covering 12.5 million sq m (4.83 sq mi) with 95,500 mines. The Royal Engineering Corps (REC) cleared all the minefields between 1993 and 2007. However, in the past few years, most mine-related incidents in the Jordan Valley took place adjacent to former minefields or in areas previously cleared and declared mine-free by REC. In 2007 and 2008, two mine accidents occurred with casualties, prompting the National Committee for Demining and Rehabilitation (NCDR) to return to

the Jordan Valley for another QM verification project. Since 24 April 2012 when Jordan was declared minefield-free, two vehicles set off anti-personnel (AP) mines, but the accidents resulted in no human casualties.

The conditions faced during the 14-year clearance efforts were as follows

- Difficult terrain with high vegetation
- High temperatures during the summer season
- Long distances between minefields, distributed along 150 km (93 mi) from the Jordan riversides to the mountains in the Jordan Valley

In addition, clearance was conducted without QM, and variable working resources (i.e., different types of mechanical minesweepers or detectors) were used for clearance. Since QM was omitted from the project, accidents occurred after clearance and credibility was lost. Although cleared, the land was not released to the end users, and NCDR could not proceed with the land-release process. NCDR performed a risk assessment (non-technical survey), which led to a verification and sampling project (Phase II) in 2009 supported by the European Commission and the governments of Belgium, Germany and the U.S.<sup>4</sup>

Although ongoing, Phase II is expected to finish by the end of 2014. NCDR cannot confidently release the land until samples of 25 percent of the cleared area verify that the land was successfully cleared. The areas needing verification are typically previously cleared minefields as well as the surrounding areas where mines possibly shifted out of place. The percentage

of sampling depends on the type of asset used (manual, mechanical or mine-detection dog) and the expected threat level. While no international standard for verification exists, Jordan checks 25 percent of the cleared area as the minimum percentage to be sampled. If a hazardous item is found, the sample area increases, potentially covering up to 75 percent of the area. If QM had been initially implemented, this operation would be unnecessary, as the areas would have been monitored during clearance and sampled after completion.

The cost of the sampling and verification project is expected to reach nearly 60 percent of the original clearance cost. By its conclusion, when NCDR can confidently release the land, it will have also reached 60 percent of the original clearance time. In the Jordan Valley, 27 suspected hazardous areas with a total area amounting to 9.7 million sq m (3.75 sq mi) were verified with 6 million sq m (2.3 sq mi) remaining. More than 2,200 mines, mine fuzes and UXO were found and destroyed during Phase II.

### Northern Border

Landmine and UXO contamination on Jordan's northern border primarily derives from Syria's involvement in the Jordanian Civil War in 1970.<sup>3</sup> The Northern Border Mine Clearance Project (NBP), initiated in April 2008, consists of 93 minefields containing both AP and anti-tank mines. NBP forms a 104 km (65 mi) belt along the northern border that covers a total area of 10.5 million sq m (4 sq mi). For this project, Norwegian People's Aid (NPA) executes the mine-clearance component, and REC's Explosive Ordnance Disposal Team is responsible for the destruction of landmines and other ERW identified within the project area. NCDR is implementing the project and carries out QM, reporting and clearance certification. NCDR

also liaises with the project's stakeholders, which include NPA, the United Nations Development Programme and the Canadian government.<sup>5</sup>

Although Jordan was declared minefield-free in April 2012, NCDR is continuing its search along Jordan's northern border for landmines that either exploded or shifted due to flooding and erosion. However, Syria's instability is delaying this verification process, throwing into question the project's final completion date.<sup>6</sup>


In the NBP, NCDR's QM team's duties include monitoring and evaluating land-release activities. Monitoring and evaluation are essential to releasing land confidently to landowners.

In general, time delay due to quality assurance during clearance operations is very minimal. Following clearance with QA, during subsequent QC, one of 10 lots may fail and need verification again. This causes a delay 10 percent of the time. Experience suggests that no more than 10 percent of areas fail during QC. Thus the total time for clearance with QM, which leads to high credibility and confidence, is 110 percent when compared to the time required solely for clearance. Cost for QM operations is also 10 percent of the clearance cost. Thus, the total time to finish this project (clearance accompanied with QM) is 110 percent of clearance time, and the cost is 110 percent of the clearance cost.

On the other hand, if external QM is required at a later date, both cost and time increase. These increases can be as much as 60 percent of the original clearance figures.

### Conclusion

QM ensures that the best demining practices are employed in the field and that the cleared land is physically checked and approved for land release.

By not conducting the necessary QM activities during the initial clearance phase, NCDR lost time and vital resources while incurring additional expenses and hurting its own credibility. Additionally, the lack of verification endangered the lives of Jordanian citizens. As NCDR proceeds with the verification process, it will continue evaluating both projects; it is apparent, however, that when conducted correctly, the application of QM activities accompanied with demining operations saves time and money. 

*See endnotes page 65*



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